

siderite; this remark also applies to those rocks which geologists, after Werner, denominate trap, and embracing the recent series; the latter term being, in many cases, useless, as applied to basaltic bodies.

Siderites are extensively distributed over many regions of the earth, varying in composition, and consequently in external character, from the pure oceanic depositions, to the numerous and varied unions of these deposits with pure vegetable and aluminous earth. In their simplicity of structure they are merely coherent masses of earth, mechanically held together, but so lightly, as to be readily separable by the fingers, and from thence they gradually acquire hardness, or, strictly speaking, like the porphyries, with which they are often confounded, they gradually silicify. Mountains of black hornblende exist in Siberia, vast strata in Saxony, and basaltic formations are very extensive in many regions. Ironstone is very abundant in this country. Specimens of siderite and basalt on analysis have been found to consist of

Siderite.		Basalt.	
Silex ..	37	Silex ..	50
Argil. ..	22	Argil. ..	15
Mag. ..	16	Mag. ..	2
Lime ..	2	Lime ..	8
Ox. of iron	23	Iron ..	25
	100		100

Coarse basalts embrace the common whinstones of the north of England and Scotland. Slaty basalts, green stones, and slates, form mountains in Sweden, often metalliferous. Some of the interior pillars of cathedrals, whinstone from the Salisbury Crags, the Melvern Hills, and much of the pavement of London, is of compact basalt; although, latterly, this material has been superseded by granite.

RETROSPECTIVE ARCHITECTURAL LITERATURE.

THE ELEMENTS OF ARCHITECTURE.

COLLECTED BY SIR HENRY WOTTON, KNIGHT,
From the best Authors and Exemplars
(Continued from p. 395.)

FIGURES are either simple or mix'd; the simple be either circular or angular: And of circular either compleat or deficient, as Ovals; with which Kinds I will be contented, tho' the Distribution might be more curious.

Now the exact Circle is in truth a Figure, which for our Purpose hath many fit and eminent Properties, as Fitness for Commodity and Receipt, being the most capable; Fitness for Strength and Duration being the most united in his Parts; Fitness for Beauty and Delight, as imitating the Celestial Orbs, and the Universal Form: And it seems, besides, to have the Approbation of Nature, when she worketh by Instinct, which is her secret School; for Birds do build their Nests spherically: But notwithstanding these Attributes, it is in truth a very unprofitable figure in private Fabricks, as being of all other the most chargeable, and much Room lost in the bending of the Walls when it comes to be divided, besides an ill Distribution of Light, except from the Centre of the Roof: So as obviously it was not usual, save in their Temples and Amphitheatres, which needed no Compartitions. The Oval and other imperfect Circular Forms, have the same Exceptions, and less Benefit of Capacity: So as there remains to be considered in this general Survey of Figures, the angular and the mixed of both. Touching the angular, it may perchance sound somewhat strangely, but it is a true Observation, that this Art doth neither love many Angles, nor few. For, first, the triangle, which hath the fewest Sides and Corners, is of all other the most condemned, as being indeed both incapable and infirm (whereof the Reason shall be afterwards render'd) and likewise unresolvable into any other regular Form than it self in the inward Partitions.

As for Figures, of five, six, seven, or more Angles, they are surely fitter for Military Architecture, where the Bulworks may be laid out at the Corners, and the Sides serve for Curtains, than for Civil Use, tho' I am not ignorant of that famous piece at Caprarola, belonging to the House of Farnese, cast by Baroccio into the form of a Pentagon, with a Circle inscribed, where the Architect did ingeniously wrestle with diverse Inconveniences

in disposing of the Lights, and in saving the Vacuities. But as Designs of such nature do more sit at Rarity than Commodity; so, for my part, I had rather admire them than commend them.

These things considered, we are both by the Precepts and by the Practice of the best Builders, to resolve upon rectangular squares, as a Mean between too few, and too many Angles; and through the equal Inclination of the sides (which make the right Angle) stronger than the Rhombe, or Lozenge, or any other irregular Square. But whether the exact Quadrat, or the long Square be the better, I find not well determined, though in my own Conceit I must prefer the latter, provided that the Length do not exceed the Latitude above one-third part, which would diminish the Beauty of the Aspect, as shall appear when I come to speak of Symmetry and Proportion.

Of mixed Figures, partly circular and partly angular, I shall need to say nothing, because having handled the simple already, the mixed, according to their Composition, do participate of the same Respects: Only against these there is a proper Objection, that they offend Uniformity, whereof I am therefore opportunely induced to say somewhat, as far as shall concern the outward Aspect, which is now in Discourse.

In Architecture there may seem to be two opposite Affectations, Uniformity and Variety, which yet will very well suffer a good Reconciliation, as we may see in the great Pattern of Nature, to which I must often resort: For surely there can be no Structure more uniform than our Bodies in the whole Figure, each Side agreeing with the other both in the Number, in the Quality, and in the Measure of the Parts: and yet some are round, as the Arms; some flat, as the Hands; some prominent, and some more retired; so as upon the Matter we see that Diversity does not destroy Uniformity, and that the Limbs of a noble Fabrick may be correspondent enough, though they be various; provided always that we do not run into certain extravagant Inventions, whereof I shall speak more largely when I come to the parting and casting of the whole Work. We ought likewise to avoid enormous Heights of six or seven Stories, as well as irregular Forms; and the contrary Fault of low distended Fronts is as unseemly: Or again, when the Face of the Building is narrow, and the Flank deep, to all which Extremes some particular Nations or Towns are subject, whose Names may be civilly spared: And so much for the general Figure or Aspect of the Work.

Now concerning the Parts in Severalty: All the Parts of every Fabrick may be comprised under five Heads, which division I receive from Baptista Alberti, to do him right; and they be these:

- The Foundation.
- The Walls.
- The Apertures, or Overtures.
- The Compartition.
- And the Cover.

About all which I purpose to gather the principal Cautions; and as I pass along, I will touch also the natural Reasons of Art, that my discourse may be the less mechanical.

First, then, concerning the Foundation, which requirith the exactest Care; for if that happen to dance, it will mar all the Mirth in the House: Therefore, that we may found our Habitation firmly, we must first examine the Bed of Earth (as I may term it) upon which we will build; and then the Underfillings or Substruction, as the Ancients did call it: For the former, we have a general Precept in Vitruvius, twice precisely repeated by him, as a Point indeed of main consequence; first Lib. 1. Cap. 5. And again more fully, Lib. 3. Cap. 3. in these Words, as Philander doth well correct the vulgar Copies.

Substructionis Fundationes solidantur (with he) si quant inveniri id solidum, & in solido. By which Words I conceive him to commend unto us, not only a diligent, but even a jealous Examination what the Soil will bear, advising us not to rest upon any appearing Solidity, unless the whole Mold through which we cut, have likewise been solid; but how deep we should go in this Search, he has no where to my remembrance determined, as perhaps depending more upon Discretion than Regularity, according to the Weight of the Work; yet

Andrea Palladio hath fairly adventured to reduce it into Rule, allowing for that Cavasione (as he calleth it) a sixth part of the Height of the whole Fabrick, unless the Cellars be under Ground, in which case he would have us (as it should seem) to sound somewhat lower.

Some Italians do prescribe, that when they have chosen the Floor or Plot, and laid out the Limits of the Work, we should first of all dig Wells and Cisterns, and other Under-Conduits and Conveyances for the Buillage of the House, whence may arise a double Benefit, for both the Nature of the Moil or Soil would thereby be safely searched; and moreover, those open Vents will serve to discharge such Vapours, as having otherwise no issue, might peradventure shake the Building. This is enough for the natural Grounding, which though it be not a Part of the solid Fabrick, yet here was the fittest place to handle it.

There followeth the Substruction or Ground-work of the whole Edifice, which must sustain the Walls; and this is a kind of artificial Foundation; as the other was natural, about which these are the chief Remembrances: First, that the bottom be precisely level, where the Italians therefore commonly lay a Platform of good Board; then that the lowest Ledge or Row be merely of Stone, and the broader the better, closely laid without Mortar, which is a general Caution for all Parts in Building that are contiguous to Board or Timber, because Lime and Wood are insocable, and if any where unfit Confirers, then most especially in the Foundation. Thirdly, that the breadth of the Substruction be at least double to the Inslent Wall, and more or less, as the Weight of the Fabrick shall require; for as I must again repeat, Discretion may be freer than Art. Lastly, I find in some a curious Precept, that the Materials below be laid as they grew in the Quarry, supposing them, belike, to have most Strength in their natural and habitual Posture. For as Philippe de l'Orme observeth, the breaking or yielding of a Stone in this Part hot the breadth of the Back of a Knife, will make a Cleft of more than half a Foot in the Fabrick aloft, so important are fundamental Errors; among which Notes I have said nothing of Pallification, or plying of the Ground-plot, commanded by Vitruvius when we build upon a moist or marshy Soil; because that were an Error in the first Choice, and therefore all seats that must use such Provision below (as Venice, for an eminent Example) would, perhaps, upon good Enquiry, be found to be at first chosen by the Counsel of Necessity.

Now the Foundation being searched, and the Substruction laid, we must next speak of the Walls.

Walls are either entire and continual, or intermitted, and the Intermissions be either Pillars or Pilasters, for here I had rather handle them then, as some others do, among Ornaments.

The entire Muring, is by Writers diversly distinguished: By some, according to the Quality of the Materials, as either Stone or Brick, &c., where, by the way, let me note, that to build Walls and greater Works of Flint, whereof we want not Example in our Island, and particularly in the Province of Kent, was (as I conceive) nearly unknown to the Ancients, who observing in that Material a kind of metallic Nature, or at least a Fusibility, seem to have resolved it into nobler Use, an Art now utterly lost, or perchance kept up by a few Chymicks. Some again do not so much consider the Quality, as the Position of the said Materials; as when Brick or squared Stones are laid in their Lengths, with Sides and Heads together, or their Points conjoined like a Network (for so Vitruvius doth call it, *Reticulatum Opus*) of familiar Use, as it should seem, in his Age, tho' afterwards grown out of request, even perhaps for that subtil Speculation which he himself toucheth; because so laid, they are more apt in swagging down, to pierce with their Points, than in the adjacent Posture, and so to crevice the Wall. But leave such Cares to the meaner Artificers; the more essential are these:

That the Walls be most exactly perpendicular to the Groundwork; for the Right Angle, thereon depending, is the true Cause of all Stability both in artificial and natural Positions, a Man likewise standing firmest when he stands uprightest. That the massiest and

* Under-digging, or Hollowing of the Earth.